morning of the 21st. This storm occupied mid-ocean in high latitudes during the 22d and 23d, and passed north of the British Isles during the 24th.

The night of the 25th low area XIII moved eastward over Nova Scotia and the morning of the 26th was central south of Newfoundland. Passing thence northeast to a position north of the Grand Banks by the morning of the 27th, attended by northwest gales of force 10 to 11, this storm moved thence rapidly eastward and united with a storm which appeared over mid-ocean on the 26th. On the 29th the pressure fell below 29.00 (736) over mid-ocean; by the 30th the storm had advanced to about the 20th meridian, and during the 31st apparently passed north of the British Isles.

OCEAN ICE.

The first Arctic ice reported since October, 1892, and the first ice reported south of the 50th parallel since August, 1892, was a large berg noted in N. 47° 35′, W. 48° 34′ on the 5th. On the 8th a long, low berg was observed in N. 48° 10′, W. 47° 26′. On the 18th a berg was noted in N. 48°, W. 46°. In January, 1892 and 1889, no ice was reported. In January, 1891, three large icebergs were observed in N. 46° 30′, W. 52° 46′ on the 28th, and on the 31st patches of soft ice were encountered in N. 45° 50′, W. 59° 20′. In 1890 vast fields of ice and enormous icebergs were encountered over and near the Grand Banks north of the 43d parallel. In January, 1882 to 1888, inclusive, Arctic ice in small quantities was reported east of Newfoundland, but in no case was it sighted south of the 43d parallel.

The positions of icebergs reported for the current month are shown on Chart I by ruled shading. Ice encountered along the Atlantic coast and in the rivers, bays, and harbors of the United States is noted under "Inland Navigation."

OCEAN FOG.

The limits of fog belts west of the 40th meridian, as reported by shipmasters, are shown on Chart I by dotted shading. Near the Banks of Newfoundland fog was reported on eight dates; between the 55th and 65th meridians on one date; and west of the 65th meridian on six dates. Compared with the corresponding month of the last five years the dates of occurrence of fog east of the 55th meridian numbered 1 more than the average; between the 55th and 65th meridians 8 less than the average; and west of the 65th meridian the same as the average. The dense fog noted by shipmasters and reported at stations of the Weather Bureau on the middle Atlantic and New England coasts generally attended the advance or passage of general storms.

TEMPERATURE OF THE AIR (expressed in degrees Fahrenheit).

The distribution of mean temperature over the United States and Canada for January, 1893, is exhibited on Chart II by dotted isotherms. In the table of miscellaneous meteorological data the monthly mean temperature and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for mean temperature and departure from the normal show, respectively, the average for the several districts. The normal for any district may be found by adding the departure to the current mean when the temperature is below the normal and subtracting when above. The monthly mean temperature for regular stations of the Weather Bureau represents the mean of the maximum and minimum temperatures.

The mean temperature was highest over extreme southern Florida, and at stations in the Colorado Desert, California, where it was above 60. The mean temperature was above 50 in Florida south of the 30th parallel, along the Gulf coast west of the Mississippi River, in eastern Texas south of the 31st parallel, and generally in California south of the 35th parallel. North of a line traced from the South Carolina coast westward to northwest Texas and southern New Mexico, thence northwestward over southern Nevada, and thence along the Sierra Nevada and Coast Ranges of mountains to northwest Oregon the mean values were above 40.

The mean temperature was lowest in Manitoba, where it was —5 to —10. The mean readings were below zero in northern Ontario, the northern half of Minnesota, and eastern North Dakota, and were below 10 in northern New England, northern New York, over the northern lake region, along the Mississippi River from Davenport, Iowa, northward, and north of a line traced from near Davenport to northeastern Montana. North of a line traced from the south New England coast to southern Illinois and central Missouri, and thence to extreme northwest Montana, and in areas in the middle and northern Rocky Mountain and plateau regions the mean temperature was below 20.

YEARS OF HIGHEST MEAN TEMPERATURE FOR JANUARY.

At Fort Reno, Okla., Fort Supply, Ind. T., Eureka Ranch, Kans., Deming and Santa Fe, N. Mex., Las Animas and Denver, Colo., Cheyenne and Fort Washakie, Wyo., Fort Robinson, Nebr., Fort Mohave and Whipple Barracks, Ariz., San Diego, Los Angeles, Riverside, and Keeler, Cal., and Fort Townsend, Wash., the mean temperature for the current month was the highest noted during the respective periods of observation.

In the 22 years preceding 1893 the highest mean temperature for January occurred from the north Pacific coast to western Minnesota in 1891; along the Atlantic and east Gulf coasts and on the southeast slope of the Rocky Mountains in 1890; over the middle and northern plateau regions in 1887; and from the Alleghany Mountains over the Ohio and Mississippi valleys, the Lake region, the middle-eastern slope of the Rocky Mountains, and the west Gulf coast in 1880.

YEARS OF LOWEST MEAN TEMPERATURE FOR JANUARY.

At Woods Holl and Nantucket, Mass., Block Island, R. I., New London and New Haven, Conn., New York, Plattsburg Barracks, Rochester, and Buffalo, N. Y., Atlantic City, N. J., Philadelphia, Pittsburg, Erie, Dyberry, Grampian, and Wellsboro, Pa., Baltimore and Cumberland, Md., Washington, D. C., Norfolk and Lynchburg, Va., Raleigh, Charlotte, Hatteras, Kittyhawk, Wilmington, Southport, and Lenoir, N. C., Statesburg, S. C., Augusta and Savannah, Ga., Jacksonville, Fla., Louisville, Ky., Parkersburg, W. Va., Cincinnati, Columbus, Cleveland, and Toledo, Ohio, Indianapolis and Lafayette, Ind., Springfield and Chicago, Ill., and Davenport and Dubuque, Iowa, the mean temperature for the current month was the lowest noted for January during the respective periods of observation.

In the 22 years preceding 1893 the lowest mean temperature for January was noted from the California coast over Nevada and eastern Oregon in 1890; on the New England coast and in an elongated area extending from the north Pacific coast to Lake Michigan in 1888; from the southeast slope of the Rocky Mountains and eastern Kansas to the south Atlantic coast in 1886; and on the middle-eastern slope of the Rocky Mountains in 1875.

DEPARTURE FROM NORMAL TEMPERATURE.

The mean temperature was below the normal east of a line traced from the Red River of the North to the lower Missis-

sippi valleys. The month was also colder than usual along the Pacific coast north of the 35th parallel, and thence over northern Nevada, northwestern Utah, southern Idaho, Oregon, and southern and western Washington. From the south Pacific coast to the lower Mississippi valley and thence to the British Possessions from Manitoba to Vancouver Island the mean temperature was above the normal.

The most marked departure below the normal temperature was shown in an area which extended from the Maryland, Virginia, and North Carolina coasts over southern Ohio, northern Indiana, and northern Illinois, where the mean temperature was 10 or more below the normal. Generally over the country east of the Mississippi River, and over Oregon, northern Nevada, and northeastern California, the mean readings were more than 4 lower than usual.

The greatest departure above the normal temperature was noted in southern Alberta, and in an area covering eastern Colorado, western Kansas, and southwestern Nebraska, where the mean readings were 10 to 12 above the January average. On the eastern slope of the Rocky Mountains from Alberta to central Texas the mean temperature was more than 6 above the normal.

The following table shows for certain stations, as reported by voluntary observers, (1) the normal temperature for January for a series of years; (2) the length of record during which the observations have been taken, and from which the normal has been computed; (3) the mean temperature for January, 1893; (4) the departure of the current month from the normal; (5) and the extreme monthly mean for January during the period of observation and the years of occurrence:

State and station.	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1893.	(4) Departure from normal.	(5) Extreme monthly mean for January.			
					Highest.	Year.	Lowest.	Year.
Arizona.	°	*Years*	°	°	°		°	
Fort Apache	34.7	21	39.7	+ 5.0	39.8	1882	27.4	1874
Fort Mohave	51.3	20	56.4	+ 5.1	56.4	1879, '93	44.0	1890
Whipple Barracks	35.1	21	40.7	+ 5.6	40.7	1871, '93	27.5	1888
Arkansas.								
Keesees Ferry	33.3	11	33.6	+ 0.3	45.6	1890	24.2	1886
California.								
Fort Bidwell	30.0	21	27.4	— 2.6	37.8	1881	18.9	1890
Riverside	50.4	11	54.6	+ 4.2	54.6	1893	43.0	1890
Colorado.								
Las Animas	23.2	11	34.6	+11.4	34.6	1893	16.4	1885
Florida.								
Merritts Island	62.4	11	58.8	— 3.6	69.8	1882	55.4	1886
Georgia.								
Forsyth	48.0	19	44.5	— 3.5	59.4	1880	40.8	1884
Idaho.								
Boise Barracks	28.4	19	26.4	— 2.0	39.2	1874	17.7	1888
Fort Sherman	25.4	9	23.2	— 2.2	34.4	1891	18.8	1890
Indiana.								
Lafayette	24.3	13	13.5	—10.8	41.3	1880	13.5	1893
Indian Territory.								
Fort Supply	29.2	14	37.2	+ 8.0	37.2	1893	19.7	1875
Iowa.								
Cresco	9.8	21	2.5	— 7.3	26.1	1880	— 1.3	1883
Kansas.								
Eureka Ranch	23.2	10	31.0	+ 7.8	31.0	1893	14.7	1886
Independence	29.1	21	28.6	— 0.5	45.8	1880	18.6	1886
Salina	24.6	10	28.6	+ 4.0	31.5	1891	20.6	1883
Louisiana.								
Grand Coteau	51.8	10	49.7	— 2.1	64.0	1890	47.2	1892
Maine.								
Orono	15.7	19	.....	.....	24.7	1889	8.2	1875
Maryland.								
Cumberland	30.0	22	22.8	— 7.2	40.7	1890	22.8	1893
Michigan.								
Kalamazoo	22.1	17	15.5	— 6.6	36.0	1880	14.0	1881
Missouri.								
Sedalia	24.9	10	21.8	— 3.1	35.6	1889	13.6	1887
Montana.								
Fort Custer	11.5	13	26.2	+14.7	28.6	1891	2.2	1886
Nebraska.								
Fort Robinson	20.9	8	29.4	+ 8.5	29.4	1893	15.7	1890
Genoa (near)	16.2	17	19.4	+ 3.2	29.2	1880	5.0	1886
Nevada.								
Browns	31.3	22	31.4	+ 0.1	39.6	1873	19.0	1888
Carson City	30.2	16	32.8	+ 2.6	37.0	1881	18.9	1890
New Hampshire.								
Hanover	17.6	22	10.3	— 7.3	25.4	1889	6.8	1888
New Mexico.								
Deming	42.0	10	50.4	+ 8.4	50.4	1893	36.8	1883
Fort Wingate	29.8	22	35.6	+ 5.8	36.8	1877	23.8	1878

Departures from normal temperature—Continued.

State and station.	(1) Normal for the month of Jan.	(2) Length of record.	(3) Mean for Jan., 1893.	(4) Departure from normal.	(5) Extreme monthly mean for January.			
					Highest.	Year.	Lowest.	Year.
New York.	°	*Years*	°	°	°		°	
Cooperstown	20.4	22	14.1	— 6.3	31.6	1880	12.3	1875
Plattsburg Barracks	16.8	22	8.8	— 8.0	27.4	1880	8.8	1893
North Carolina.								
Lenoir	36.3	21	27.3	— 9.0	46.5	1890	27.3	1893
Oklahoma.								
Fort Reno	31.8	10	40.2	+ 8.4	40.2	1893	23.0	1886
Fort Sill	35.9	21	39.0	+ 3.1	48.1	1880	25.7	1875
Oregon.								
Bandon	43.6	9	.....	.....	48.8	1891	39.6	1888
Pennsylvania.								
Dyberry	21.7	22	14.1	— 7.6	31.6	1890	14.1	1893
Grampian	23.2	22	15.0	— 8.2	35.0	1880	15.0	1893
Wellsboro	25.4	13	15.8	— 9.6	35.8	1890	15.8	1893
South Carolina.								
Statesburg	45.3	11	38.0	— 7.3	54.6	1890	38.0	1893
South Dakota.								
Fort Sully	12.2	22	14.9	+ 2.7	30.3	1891	0.1	1875
Texas.								
Austin	47.8	21	47.8	0.0	59.5	1880	40.0	1892
Silver Falls	40.7	7	43.2	+ 2.5	46.6	1890	36.2	1892
Utah.								
Terrace	22.6	21	21.7	— 0.9	31.4	1872	9.8	1858
Vermont.								
Strafford	16.4	19	9.4	— 7.0	25.4	1889	6.9	1888
Virginia.								
Dale Enterprise	32.8	13	22.2	—10.0	48.1	1890	20.7	1881
Washington.								
Fort Townsend	38.0	18	35.7	— 2.3	35.7	1893	30.3	1875
West Virginia.								
Parkersburg	31.9	12	21.9	—10.0	42.4	1890	21.9	1893
Wisconsin.								
Embarrass	12.8	22	.....	.....	27.3	1880	0.2	1875
Madison	16.3	22	7.2	— 9.1	33.6	1880	4.1	1875
Wyoming.								
Fort Washakie	14.5	10	29.6	+14.1	29.6	1893	6.6	1888

MAXIMUM TEMPERATURE.

At San Diego and Los Angeles, Cal., Helena, Mont., Spokane and Fort Canby, Wash., the maximum temperature for the current month was the highest ever reported for January.

The highest temperature reported by a regular station of the Weather Bureau for January, 1893, was 84, at Los Angeles, Cal., on the 3d. The temperature reached 80 at San Diego, Cal., on the 2d, and 81 at Corpus Christi, Tex., on the 11th. The maximum readings were above 70 south of a line traced from the Atlantic coast between Savannah, Ga., and Charleston, S. C., to west-central Kansas, thence to southeastern New Mexico, thence to southern Nevada, and thence to the California coast in latitude about N. 35°. Along the Mississippi River from Davenport, Iowa, northward, and in Upper Michigan, northern Lower Michigan, Wisconsin, Minnesota, and eastern and northern North Dakota the maximum temperature was below 40.

MINIMUM TEMPERATURE.

At Atlantic City, N. J., Lynchburg, Norfolk, and Cape Henry, Va., Raleigh and Kittyhawk, N. C., Augusta, Ga., and Helena, Mont., the minimum temperature for the current month was the lowest reported for January during the respective periods of observation.

The lowest temperature reported by a regular station of the Weather Bureau for January, 1893, was —43, at Havre, Mont., on the 31st. The minimum temperature was —42 at Helena, Mont., and fell below —30 generally over Montana, North Dakota, and northwestern Minnesota. The line of zero temperature is traced from southern Maryland to extreme northern Georgia, thence to Cairo, Ill., thence to Oklahoma, thence to northeastern Kansas, thence to west-central Kansas, thence to Cheyenne, Wyo., thence to south-central Colorado, thence to northern Utah, central Nevada, and northeastern California, and thence irregularly northward to northwestern Washington. The highest minimum temperature, 52, was noted at Key West, Fla., and the minimum

values were above 30 over the southern half of the Florida Peninsula, along the Gulf coast west of the Mississippi River, and in western and southern California.

LIMITS OF FREEZING WEATHER.

The southern limit of freezing weather in January, 1893, is shown on Chart V by a line traced across the Florida Peninsula south of Titusville and Tampa, and inside the Louisiana and Texas coast line. The western limit of freezing weather is shown by a line traced from southwestern Arizona over the central valleys of California to a point on the coast north of Eureka, Cal.

RANGES OF TEMPERATURE.

The greatest daily range of temperature is shown in the table of miscellaneous meteorological data. The greatest monthly range of temperature occurred at Helena, Mont., where it was 101. From Montana the monthly ranges decreased eastward to less than 50 over Lake Michigan and on the south New England coast, southeastward to less than 30 over extreme southern Florida, and to less than 40 at Port Eads, La., and Galveston, Tex., and westward and southwestward to less than 30 in northwestern and west-central California.

COLD WAVES.

From the 1st to the 3d a cold wave advanced from the region north of eastern Montana and North Dakota to the middle Atlantic and New England states, carrying the line of zero temperature to Springfield, Ill., on the 3d, and causing the lowest temperature of the month at Northfield, Vt., —26, on the 4th.

A cold wave of marked severity over the Southern States appeared over eastern Montana and Assiniboia on the 4th and overspread the east Gulf and south Atlantic states during the 6th and 7th. On the 6th the temperature fell to 12 at Atlanta, Ga., and to 32 at Mobile, Ala. The morning of the 7th the temperature was below freezing in northern Florida, reaching 31 at Tampa, Fla., and frost was reported as far south as Jupiter, Fla.

From the 7th to the 9th a cold wave advanced from the Missouri Valley to the Southeastern States, carrying the line of freezing weather to Jacksonville, Fla. The morning of the 9th a cold wave appeared over North Dakota, from which region it advanced to the middle Atlantic and New England states by the evening of the 10th and to the Southeastern States by the morning of the 11th. On the 11th the temperature fell below zero generally in New England, the minimum was below freezing over the north part of the Florida Peninsula, and light frost was reported at Jupiter, Fla.

A cold wave appeared over Alberta on the 10th, overspread the middle Rocky Mountain region on the 11th, reached the lower Missouri and lower Mississippi valleys on the 12th, and the south Atlantic coast on the 13th. The morning of the 14th the temperature fell to freezing, and ice ¼ inch in thickness formed at Titusville, Fla., and heavy frost was reported at Jupiter, Fla.

From the 14th to the 16th a severe cold wave advanced from the middle Rocky Mountain region to the Atlantic coast. On the 15th the temperature was 10 to 15 below zero in the middle Ohio valley. On the 16th the lowest temperature on record for January at Atlantic City, N. J., —4, was noted, and the minimum fell to —10 at Knoxville, Tenn., and to —4 at Lynchburg, Va. On the 16th and 17th the lowest January temperatures on record were reported at points in the Carolinas. On the 16th the temperature was below freezing in northern Florida. The morning of the 17th the temperature at Jacksonville, Fla., was 24, pineapples in exposed places about Jupiter, Fla., were damaged, and vegetation was reported killed to the southern extremity of the "Everglades."

From the 17th to the 20th a cold wave advanced from the middle plateau region and northeast slope of the Rocky Mountains to the Atlantic and Gulf states. From the 17th to the 20th the weather was cold generally throughout Texas. The morning of the 20th the minimum was 26 at Charleston, S. C., and 22 at Mobile, Ala.

From the 24th to the 26th a cold wave from the Northwest overspread the central valleys and the Lake region, carrying the temperature to —30 at Moorhead, Minn., on the 26th. This cold wave was not severely felt in the Atlantic coast states.

A cold wave advanced from the middle plateau region over the central valleys, the southern lake region, and the Southwest during the 28th and 29th. On the 30th a slight fall in temperature occurred in the Atlantic coast states.

The lowest temperature of the month was noted generally over the Dakotas and Montana on the 31st, and the lowest temperature on record at Helena, Mont., for January, —42, was registered. On that date the temperature was —30 to —40 in Montana and western North Dakota, reached —43 at Havre, Mont., and fell to zero in northern Kansas. On the 30th and 31st the cold was exceptionally severe in the north Pacific coast states.

FROST.

In Florida the severest frosts of the month were noted on the 7th, 14th, and 17th. On the 7th ripening strawberries, oranges, and some orange trees were frozen at Flatwood, 2 miles northeast of Eustis, Fla.; frost was reported at Jupiter; ice ⅛ inch in thickness and frost were noted at Titusville; and tender vegetation about Tampa was injured by cold. Light frost killed tender vegetation about Jupiter on the 11th and 13th.

On the 14th orange trees were frozen at Flatwood, and heavy frost killed many plants about Jupiter; pineapples were not seriously damaged. At Titusville heavy frost and ice ¼ inch in thickness formed; oranges on trees back from the river were reported frozen solid. At City Point all tender vegetation and bananas and oranges exposed to the westerly wind were killed. Thin ice was reported at Fort Pierce, 92 miles south of Titusville. At Tampa the temperature fell to 31 without causing material damage to fruit.

On the 17th the temperature fell to 24 at Jacksonville, the lowest temperature noted at that station since January 4, 1887. At Titusville a large number of young fish were reported killed by cold. About Jupiter tender vegetation and pineapples in exposed places were injured, and damaging frost was reported to the southern extremity of the "Everglades." At Tampa the minimum temperature, 29, was the lowest noted at that place since 1886, and oranges in exposed places were slightly injured. On the 19th heavy frost injured tender vegetation about Galveston, Tex.

PRECIPITATION (expressed in inches and hundredths).

The distribution of precipitation over the United States and Canada for January, 1893, as determined from reports of more than 2,000 stations, is exhibited on Chart III. In the table of miscellaneous meteorological data the total precipitation and the departure from the normal are given for regular stations of the Weather Bureau. The figures opposite the names of the geographical districts in the columns for precipitation and departure from the normal show, respectively, the averages for the several districts. The normal for any district may be found by adding the departure to the current mean